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EVALUATION OF AND RECOMMENDATIONS FOR THE PL/GP COMPUTER NETWORK

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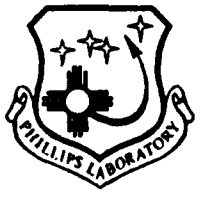

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The author carried out a three-month assignment in the Phillips Laboratory/ Geophysics Directorate (PL/GP) Communication and Computer Systems Division (SC), charged with developing a user requirements document to aid in providing better service to the PL/GP computer user. Fifty PL/GP computer users were interviewed on a variety of topics including their computer use, network performance, documentation, notification, and SC-user communication. The results were summarized and recommendations were made from the results. SC personnel were then asked to react to user input by answering questions relating to concerns voiced by the users.

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1. INTRODUCTION

Fifty users of the Phillips Laboratory Geophysics Directorate computer system (hereafter referred to as the PL/GP network) were interviewed during October and November 1991. The purpose of the interview program was to evaluate the computer network environment and documentation of that environment from a user's point of view. The goal was to determine what presently available capabilities are being used and the user's perceptions on their ease of use and reliability. In this way, improvements in network hardware, software, applications, documentation, and services may be considered that would make the networked computer systems easier to use.

In selecting a pool of interviewees, we decided to target the ten most frequent users of each type of computer work environment: Convex, Cyber, VAX, Workstation System Administrator, Personal Computer (PC) and Cray-2. The following numbers of persons were actually interviewed as users of each computer type:

Computer Type	Number of Users Interviewed
Convex	9
Cyber	6
VAX	9
Workstation/SA	9
PC	7
Cray-2	10
Total	50

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For the most part, the persons actually interviewed were significant users of the computer system specified. Originally, this was determined using the following criteria:

Computer Type	Usage Criterion
Convex	10/91 connect time
Cyber	6/91 CPU time
VAX	9/91 CPU time
Workstation/SA	known recommended user
PC	taken from list of PC
Cray-2	nodes current local users

In some cases, when originally selected interviewees were not available, their names were dropped and others were substituted. Still, we found that all interviewed were current users who login regularly to some computer which is a part of the PL/GP network.

2. RESULTS OF THE USER INTERVIEW

The following section presents the results of the interviews, arranged by computer type. This organization was chosen so that the reader might only have to read the results for the computer he/she uses. If the reader is not concerned with the details and wishes only to see a summary of all user input, he/she should skip ahead to Section 3.

2.1 Convex Users

What Phillips Laboratory computers do you use?

Why?

All users interviewed use at least one other computer in concert with the Convex. In several cases, the Convex is used in connection with a workstation, in which the large data sets, and the long and large memory codes are used on the Convex itself while source code editing, debugging, and results post-analysis is done on the workstation or PC. Two users access the Convex from the Cyber, from which they ship programs and data files to the Convex and run them there. Their reason for using the Convex was the imminent loss of the Cyber. Several people stated that they were UNIX users, and liked a local UNIX mainframe with vector processing capability (especially since this feature is still not working on the VAX 9000).

Two users stated that they have probably outgrown the Convex but had not migrated to the Cray-2 because of the paperwork hurdle, and that they have not received any help from PL/SC in overcoming it. Five of the users use VAX for file storage, file distribution [to-from the Central File Storage System (CFSS)], or electronic mail (e-mail).

What computer applications (graphics, word processing, etc.) do you use? What other applications would you use if available?

Currently used:
graphics: NCAR graphics, IDL v.2, TEKSIM (or graphics such as CANVAS, VTEK, or own plotting packages on workstation or PC).

Wordprocessing (all done on front-end PC or workstation): TROFF, TeX, LaTeK, EXP

Other applications: IMSL, C compiler, VECLIB, X-windows.
Would use if available:
AVS (3-D) graphics.

How do you currently access each of the computers you use?

Several users have ethernet connections on their PC or workstation, so they access the Convex either through PCSA (Pathworks) or by logging into their workstation and using TELNET. For these users, the direct ethernet connection to the Convex does not allow them to run graphics on the Convex and use the Tektronix emulator (FTEK, VTEK) on their terminal. Some of these users requested that this apparent incompatibility between the ethernet and Tektronix emulation on their terminal be addressed. Several other users still had the Ungermann-Bass NIU connection which allows them to access the Convex by first logging into the VAX or connecting through CDCNET (crec UNICON). One off-site user uses a 2400 baud modem to access the ethernet, from which he accesses the Convex with the commands: connect TELNET, open UNICON.

Which network protocol (DECNET or TCP/IP) do you use?
Are you satisfied with it?

The Convex users interviewed primarily use TCP/IP for connections and file transfers. Two PC users do a "set host unicon" (DECNET connection) from their PSCA PC or the VAX. All users agreed that the performance of TELNET and FTP are now satisfactory. One user would like to see documentation for FTP available. Another user felt the FTP transfer speeds he had been seeing (4-5 kbytes/sec) could be improved upon, and had in the past experienced connection interruptions as often as 5 times/day.

How do you transfer files between any of the computers you use?

Here again, the predominant mode of file transfer was FTP. Users regularly move files between the Convex, VAX, Cyber, and their workstation (for those that are ethernet hosts). Some PC users use the Network File Transfer (NFT) to bring their files from UNICON to the PC, and then download them to floppy disk. One user uses the SNS (formerly TCPGTE) gateway to access a nearby workstation using connect TELNET, open hostname. Another user stated that he found he had to set his FTP session to binary mode to accomplish a text file transfer from the Convex to his workstation.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

Not a single user interviewed sends mail messages on the Convex. Three users admitted they neither send mail nor read their mail. When asked why, they stated that they rarely knew they have mail. The notification "you have mail" comes before the login notices on the Convex, and this all scrolls by so fast that they never see this notification. Indeed, of the 10 Convex users I sent mail to, only 3 responded by mail, and 2 of these responded using VAX mail. Two people interviewed said they use the VAX for their mail (sending and receiving), and two users use their workstation for that purpose.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, or sending or receiving mail?

One concern raised by several users is the occasional loss of the connection during a terminal session or a file transfer. When this happens, there is no notification of the loss of connection, the session isn't recovered, and their is no notification of non-recovery of the session when the person logs in again. Otherwise, connecting and file transfer reliability has improved dramatically and is satisfactory.

A major concern of three users was the mail on the Convex. One user didn't know how to access outside hosts on his workstation if the local computers (Convex, VAX) are down. Another user couldn't send off-site mail successfully from the VAX. He was unable to send, got a return (error) message that was unclear, and later found out his message wasn't sent.

The third user is a very frequent intercontinental mail user, who uses SPAN regularly on the VAX to send mail. However he has never successfully sent mail between the VAX and the Convex. He found that he couldn't even reply to a mail message he received on the Convex. He felt that e-mail concerns such as his were not receiving the level of attention they deserved.

Have you used the on-line document "userinfo" on any of the mainframes? If so, please comment.

All four of the users who have looked at "userinfo" on the Convex have found it lacking. One of them stated that he feels there is virtually no useful (local) documentation on the Convex. He wanted a list of all application software and a one-line description of each package. He felt there were a lot of applications (especially on the VAX) that "no one" uses (for example, VAX NOTES). Another user strongly

prefers manuals to on-line documentation, including the "man" pages. Several users said the "man" pages are difficult to use because it is hard to find what one really needs in the midst of all the detail.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network? How far in advance would you like to know?

Four users stated a preference for hardcopy notices, primarily because login notices are too hard to read (they scroll by too fast). Three users thought the login notices were satisfactory, and three users thought the user group meetings were the preferred means of hearing of such changes.

Concerning the login notices, several persons thought they contained too much detail and were thus too long (entire notices should fit on one screen). Another suggested the "more" utility be built into the login notices to allow the user to page through them. Another user stated that he preferred the "msgs" utility instead of the login notices.

Concerning the user group meetings, one user felt that besides announcements, each meeting should concentrate on a single issue of interest. Another user wants SC to regularly announce their current plans at the meetings and invite feedback from users. They both found the meetings to be helpful. All users wanted to be notified at least a week in advance for downages, changes in purge policy and the like.

What input do you have on changes that have already been made?

TEKSIM on the Convex is popular among former Cyber users. The network is now considered more reliable.

Some problems experienced by Convex users: EMACS, Vi editors don't perform fully on the Convex; problems accessing EMACS, getting EMACS documentation; SC has bought too much software/applications for the VAX; lack of understanding of NFS on Unix machines ("where are my files actually residing"?); batch files do not work right consistently; would like to log in to each host once, rather than having to log in each time you switch to another host.

How do you communicate with SC about your problems?

Five users stated that they regularly walk down to the user services area and try to find the person who they think is most knowledgeable in the area related to their problem. Three users either send e-mail to user services or use the telephone, and the other person sends e-mail directly to the responsible SC person.

Has the current method of problem solving by SC been effective for you?

All but one user stated that the answer to this question was an unqualified "yes". The other person felt the support was good within the manpower constraints of SC. All felt the User Services personnel were responsive and helpful.

Do you think a "help desk" (a single point of contact) approach in User Services would be beneficial to you?

Two users felt it would be, six users preferred the present "direct access" system, and one stated no preference. Of the users opposed to the help desk idea, most liked the service they got through talking to the relevant person directly, because a "middleman" could either lose, confuse, or delay the request.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

All users stated that they rarely or never see it, and all agreed it would be more convenient on-line. A one-line login notice should be posted when a new one is installed, and another user suggested that a one-page summary be sent to all users.

2.2 Cyber Users

What Phillips Laboratory computers do you use? Why?

Only one of the six users interviewed use the Cyber exclusively. All stated that their use of the Cyber is dictated by the large size of their problem and the use of tapes and software to read or copy those tapes that reside on the Cyber. Several users stated that they are either using the VAX for file storage, or are migrating to the VAX in anticipation of the loss of the Cyber. One user transfers data and programs back and forth between the Cyber and the Cray-2, while another user is beginning to use the Convex.

What computer applications (graphics, word processing, etc.,) do you use? What other applications would you use if available?

Currently used:
graphics: DISPLAY (on VAX), TEKSIM, NCAR, TEKSIMC, own package wordprocessing (on PC):

Wordperfect, Eve

other applications: ISML, bit manipulation libraries.

Would use if available: none specified

How do you currently access each of the computers you use?

Three users connect to Cyber via the Ungermann-Bass NIU, which is preferred for graphics display at the terminal (Tektronix emulator doesn't work or the ethernet). One person dials into the network via a 2400 baud modem, and two more have PC's on a terminal server to the ethernet. One user stated that she found that most PCSA software is not compatible with her PS/2 personal computer, and this hampers her

use of the ethernet connection.

Which network protocol (DECNET or TCP/IP) do you use? Are you satisfied with it?

Two users use DECNET mostly, two use TCP/IP, and one uses XMODEM to transfer files from Cyber to PC. They found the file transfer utilities to be reliable.

How do you transfer files between any of the computers you use?

Several users FTP their files from the Cyber to the VAX, then use PCSA (NFT) to download them to their PC. Two users transfer their files from either the VAX or Cyber to CFSS. One user transfers data exclusively between the Cyber and his offsite PC using XMODEM.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

Three of the users are regular VAX mail users. Two of them use SPAN to send and receive mail internationally. They find that the SMTP utility generally works well, but that on occasion they find they can't reply to mail sent to them.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, and sending or receiving mail?

Formerly, users experienced problems connecting to CL9000 ("all ports busy") and on some occasions had trouble getting to CDCNET. One user noted that he thought NOS/VE runs a lot slower than NOS on the Cyber. The modem user stated that the phone line connection to the network is unavailable at a frequency of about once per month. Another user reported that he had experienced problems with a lack

of space available for his files on CFSS. File transfers to the Cray-2 from the Cyber are slow (6-8 kbytes/sec) but reliable. Several users (not only Cyber users) expressed frustration with their attempts to send mail to NSSDCA in Italy, which appears to deny their connections. Requests to SC for assistance have produced no improvement so far.

Have you used the on-line document "userinfo" on any of the mainframes? If so, please comment.

Since this utility is not available on the Cyber, only the two VAX users responded. Both had seen the document and felt that it could be improved. One would like enough information in "userinfo" so that he could at least ask more specific questions of User Services about applications. The other thought that the section on available printers should include the print queue names so they could be used in the "submit" commands or "print" commands.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network?

All users interviewed commented on the login notices. They agreed that in general they were satisfactory, but several had specific comments. One said that some notices are too long-perhaps the details could be given elsewhere. She would like to see a "status" utility, which would give the status of hardware, network, and peripherals. She has been confused about the ramifications of announced downages - what applications are affected if a certain portion of the system is down? The users desired a one-to-two week notice of system changes or downages.

What input do you have on changes that have already been made?

The big issue for Cyber users was the decision to eliminate the Cyber at the end of FY92. In particular, a major concern was the perceived lack of tape drive support once the Cyber is gone. Two users had responsibility for hundreds of tapes, many of which are Cyber RECLAIM tapes, and expressed concern

about whether the tape drives and software would be available to read them. Furthermore, there was a concern that with the emphasis to shift from tapes to disk for long-term archival storage, that the storage capacity will become quickly saturated with all the files on hundreds of tapes they have. They felt that tapes will be an incoming form of data storage media that they will have to deal with for years to come, and question whether local disk space will be sufficient to store it all.

I will include for the record their concerns about a need for long-term planning of mainframe availability. They felt that they were given direction to go to the Cyber for their tape processing so they did so. They made a major investment in developing software and procedures, and in writing tapes on the Cyber, only to find that it is now going away. They feel an uncertainty about what mainframes that they could count on to be here for them in the coming years. "If we change to the VAX and it goes away, what then?" Basic commands, tape formats, and software must vary so much from system to system. They felt a need for an announced long-term plan for what computers and media will be available. They could use this as a more confident basis on which to plan their strategy for handling their large datasets in the future.

Another user suggested that instead of converting all of the tapes we presently have to new tapes or disk storage so non-Cyber mainframes can read them, why not have available the software on the non Cyber machines to read the existing tapes. Two other users will be migrating away from mainframes altogether. One will start obtaining his data on a different media, so he will not use the PL/GP network anymore. Another plans to use the mainframes only as a file server for his PC on which he plans to run all of his programs. He called for generic binary data structure that would be compatible with all platforms, so that any such file could be used on any computer in the network.

Finally, a user stated that it is somewhat inconvenient to go to several working group meetings where before she attended only one per month. She suggested that quarterly we might have a combined use group meeting to hear about decisions/plans/changes that pertain to the PL/GP network as a whole.

How do you communicate with SC about your problems?

Two of the users communicate with user services by telephone: the other four walk down and talk to the person responsible for their area of concern.

One person stated that they tried using e-mail to User Services, but found that she received lower priority than the people who show up in person.

Has the current method of problem solving by SC been effective for you?

Three users stated that the support they received from user services was satisfactory or good. One user wished programming support was available, but agreed that the network and operating system support was satisfactory. Another said that while support generally has been good, they found that they had to solve the problem of converting Cyber-compatible files to VAX-compatible files by themselves, so that they consider themselves the experts in that subject. The third user expressed frustration with having to re-explain the problem too many times to too many people. She has been told on at least on occasion that user services would not have time to investigate her problem. She feels that support has improved in September and October.

Do you think a "help desk" (a single point of contact) approach in user services would be beneficial to you?

All six interviewees prefer to address the responsible person directly.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

Three users see it regularly, two users never see it, and one sees it irregularly. All agreed that on-line would be more convenient. One user requested that minutes of the working group meetings be put on-line on their relevant mainframes.

2.3 VAX Users

What Phillips Laboratory computer do you use? Why?

In the group of VAX users I interviewed, I did not encounter a single VMS-UNIX user. Three of the people were former Cyber users, who are still in the process of migrating from Cyber to VAX. They have chosen the VAX because they were already somewhat familiar with VMS, and found that VMS was even a "friendlier" operating system than the NOS or NOS/VE. The other users chose the VAX as their primary mainframe for a range of reasons including VMS familiarity, fast processing speed, available memory, large data storage requirement, access to the Central File Storage System (CFSS), and a more universal and standard operating system. Several of the users use the VAX in conjunction with their PC or workstation, using the VAX for large data processing and their terminal to display results or download onto diskettes.

What computer applications (graphics, word processing, etc) do you use? What other applications would you use if available?

Currently used:
graphics: IDL, P6LIB graphics library, NCAR, IDL v.2, DISSPLA, TEKSIM

wordprocessing (on PC): Eve, LaTeX (on microvax), Wordperfect; other applications: ISML, performance analyzer, system routines for tapes, debugger.

Would use if available: more help in using DISSPLA, IMSL with "g" floating point, Wordperfect on VAX, LaTeX on VAX.

How do you currently access each of the computers you use?

Four users have an Ungermann-Bass NIU connection to the network, one user has a PCSA-ethernet connection, and one has both. Three users have modem connections through a multiplexer network from off-site via 2400, 4800, and 9600 baud modems respectively. The person who has both the NIU and the PCSA-ethernet uses the NIU connection for Tektronix emulation at her terminal, and PCSA for everything else. Here again, the issue of incompatibility between ethernet and Tektronix emulation arises.

Which network protocol (DECNET or TCP/IP) do you use? Are you satisfied with it?

Three users use neither protocol, use TCP/IP exclusively, and the remaining four use a combination of DECNET and TCP/IP. No one reported any problems using either protocol, and one user even stated that through the SPAN network he can SET HOST to the PL/GP VAX computers from a remote location and get an excellent connection.

How do you transfer files between any of the computers you use?

Of the nine people interviewed, only one regularly transfers files between mainframes (Cyber to VAX using FTP). This perhaps should not be surprising in light of the fact that none of the interviewees were VMS-UNIX users. They perform all (with the exception of the migration from the Cyber) of their mainframe work in the VMS domain, which restricts them to the VAX cluster. Five users transfer files between the VAX and their PC or workstation using "Kermit" or FTP. One person uses FTP to transfer files from offsite to the VAX.

Three users made explicit reference to their use of the scratch disk on the VAX. Presently, the scratch disk is purged of all files each Monday. One user said that this causes him to lose files occasionally when he stages data on the scratch disk then his colleague fails to upload the files to his PC before the purge deadline. Another user said that he often falls victim to the "scratch disk scramble" as users scramble to get their files on the scratch disk before anyone else does. A third user said that the purge policy was the motivation for him to begin using CFSS.

Five users mentioned their experience with CFSS. In general, they see CFSS as a viable means of archiving their large data files. One user stated that he felt CFSS was overloaded, while another observed difficulty using CFSS from Cyber - NOS/VE and also mentioned that CFSS had a history of uncertain availability ("crashing"). Users also mentioned the fact that CFSS is not available from the VAX-9000 and difficulty in using CFSS from the VAX in the batch mode (one user wishes CFSS would send a numerical code to indicate the error status so that he could deal with it within the logic of his command procedure) as concerns.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

Six of the users consider themselves to be significant e-mail users. In addition to sending VAX mail to other VAX users on the PL/GP network, several users send mail offsite using the SMTP utility or the SPAN network.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, or sending and receiving mail?

The main limitation expressed in connections to the VAX is the "all GL9000 ports are busy" response when trying to connect to the VAX-9000. One user thought the telnet connection to the VAX was slow, while another user felt that the VAX is down too much of the time and that we need another fast computer to relieve the load on the VAX.

One user mentioned that sometimes in the past FTP would "die" when run in a batch job but noticed it had been more reliable lately. Another user stated a desire to be able to use VTEK and Kermit to transfer files via SPAN on the VAX-9000; presently, he can only do this on the VAX-8650.

Most users stated the e-mail performance had been satisfactory. Occasionally, some have encountered problems such as "remote node unavailable" or other cryptic messages they don't understand. They request that more clear and descriptive diagnostic error messages be available when a send-mail session aborts. Also, they would like a way to confirm that the message was really sent to the addressee. A new user said that he hasn't been able to send or receive mail at all on the VAX. Apparently he doesn't have sufficient privilege for mail and doesn't know what to do about it. (I encouraged him to report his problem to user services immediately).

Have you used the on-line document "userinfo" on any of the mainframes? If so, please comment.

Only three of the users have used "userinfo" on the VAX. Only the new user commented significantly about it. He said that he found the document to be helpful, and would like to see a table of contents placed within the longer entries. Another user suggested that each entry be put in chronological order, with the date of each revision noted at the top of each section of the entry.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network? How far in advance would you like to know?

Seven of the nine users interviewed felt the login notices were adequate notification of major changes or news about system availability. However, they differed on the length of notification they desired, which varied from one or two days to a minimum of a month. The other two users thought mail messages should be sent for important items since they can easily be lost in the login notices or missed in infrequent logins. Also, an interest in keeping the notices to one screen was expressed, infrequent logins. One user felt that a major problem was the dependence of the computer center on the chilled water, which, when not available renders the system useless. Two users stated that they would like to be informed of proposed policy changes well in advance of the change date in order to allow time to give input. Another user thought that the minutes of the working group minutes should be e-mailed to all members of that group.

What input do you have on changes that have already been made?

Five users voiced some degree of displeasure with the proposed elimination of VMS as an operating system on the VAX. They felt the VMS operating system was superior to UNIX, and that converting to Unix is a step backward. Also, conversion to UNIX would require a lot of unnecessary conversion of VMS command procedures to UNIX shell scripts. Other comments pertained to the present scratch disk policy, which they felt was appropriate, and their approval of the CFSS purge policy.

The users commented on data archival issues. Since we only have access to CFSS through the VAX-8650, the requirement that users must use the "sysmag" tape queue for batch jobs creates problems. They would prefer to access to CFSS directly from the VAX-9000. The scratch disk is not large enough for its present usage policy, so instead the files should be deleted automatically when one logs off or the batch job finishes. In the batch command procedure or interactively, the user could archive the file to CFSS before logging off. Thus, the scratch disk would only hold files for active jobs, while the CFSS would be used for short-term archival of large files. Another user was concerned about the near-term disk storage plans - he felt that larger magneto-optical disks will be needed. The third user felt that the VMS to UNIX conversion could be justified only if this would allow the purchase of significantly cheaper (thus more) disk storage.

Several other miscellaneous comments surfaced: a desire for virtual memory on the VAX to avoid hitting limits for large arrays, the vector compilation option is not working on the VAX-9000 and this

compromises the speeds of some users' applications, introductory courses needed for new users, on-line primers or tutorials would be helpful (VMS, Unix, PCSAm etc.), and a change of password expiration policy so that the password is not lost to the user when it expires - instead, it simply prompts him to change his password immediately in that session because his present password has expired.

How do you communicate with SC about your problems?

Four users usually talk face-to-face with the responsible person directly, four usually telephone user services, and one person uses e-mail. Two users mentioned that they had sent e-mail messages that were never answered. Those who telephone like to talk directly to the person responsible for their area of concern. Some low priority issues are sent by e-mail to user services. One user found that submitting requests for help to specific people by e-mail wasn't being honored, so he started talking to the people face-to-face.

Has the current method of problem-solving by SC been effective for you?

Four users stated that the support they have received from SC has been satisfactory, or even very good. The five other users have had problems in the past with getting satisfactory support. Two users found that they had to resolve problems with reading foreign (stranger) tapes by themselves. One said that he felt that whenever he encountered an esoteric problem such as a foreign tape or a special binary format, that he was forced to solve the problem himself. The new user had to deal with several people in establishing an account and found it confusing. No one person took the time to see him through to getting a fully successful account started - his user name is still wrong and he still can't use the mail utility. He feels that the person who starts the process of resolving a problem with the user should be the person who finishes it. Another user finds it very confusing to know what person is in charge of what areas. She felt that poor communication exists between the SC personnel, so that one person doesn't know fully what the others are working on. She may end up trying to get a problem resolved by one person in SC when another in SC has already found a solution to that problem. Finally, the fifth user stated that on a least one occasion, a backup tape was lost by SC personnel, so that he couldn't restore his files.

Do you think a "help desk" (a single point of contact) approach in User Services would be beneficial to you?

Four users preferred the single point of contact idea, while five persons liked being able to contact a person directly. Reasons stated for the help desk method were: low staffing levels make it harder for the user to find the right person to talk to, a help desk would allow a logging in and tracking of the problem to make sure the problem is solved to the users' satisfaction, one support person is assigned to a problem rather than passing the customer from person to person, and it avoids the problem of having to re-explain the problem to several people before the user finds the right person.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

Four users have not seen the newsletter, while the other five have seen it at least occasionally. Only two users reacted negatively to the idea of putting the newsletter on-line. Several wanted access to hard copies of the document.

2.4 Workstation Users

In this category, several of the persons interviewed are administrators of either a single workstation that several people use, or subnets of several workstations or PCs. They were asked to respond to the questions from the standpoint of the impact of SC's operations on their host or subnet.

What Phillips Laboratory computers do you use? Why?

All persons interviewed use either the VMS or Unix mainframes significantly on a regular basis. This may be for file server purposes only, or for their main "number cruncher" whereby they bring output

back to look at on their workstation. Not a single workstation user has completely cut him/herself off from central computing, but maintains a link in some way or other.

Some of the ways the mainframes are used in conjunction with the workstations: IDL run on VAX-9000 while logged into VAX through workstation using X-windows; transferring files to mainframes for either disk storage or CFSS storage, read tapes on CYBER, send to CFSS, retrieve on VAX-9000 then ship to VMS workstation, run computationally intensive codes on Convex and then examine results graphically on workstation.

Several workstation users commented on why they now do most of their computing on workstations. One administrator said that his division is setting up an entire data analysis center that would be contained completely within his division. Another noted the speed and reliability of modern workstations, and the fact that it is a dedicated (one-user) computer. He also mentioned the convenience and graphic capabilities as factors for being a workstation user. Still another user mentioned the fact that extensive collaboration with other scientists in her field elsewhere required the use of compatible workstations. Other factors mentioned were: interactive graphics capabilities of workstations, need of a local file server for large databases, relieve workload on CYBER, GP network was unreliable, desire to use NFS, need to download large data files to optical disk for shipment to other users, Convex and VAX-9000 becoming slower in turn-around than workstation due to user load on mainframes.

What computer applications (graphics, work processing, etc.) do you use? What other applications would you use if available:

Currently used:
graphics: MATLIB, IDL, PVWave, TEKSIM, NCAR, PHIGS, GKS, DISSPLA, Graphicus, ISATEK, Mac-Write, Paint, Draw,

word-processing: Framemaker, MASS11, Microsoft Word, XROFF, Decwrite, XYWrite, Mathematica, LaTeX, other Applications: X-windows

Would use if available: SUN IDL, SUN AVS, SUN SPYGLASS, Mathematica and IMSL on central site computer (so that they can be accessed from jobs running on workstation), ability to fax computer documents from GP to offsite locations.

How do you currently access each of the computers you use?

Because all workstations or subnets are nodes on the ethernet, TELNET, set host, and login are used predominantly with this group of users.

Which network protocol (DECNET or TCP/IP) do you use? Are you satisfied with it?

Five users regularly use TCP/IP only, two use DECNET only, one uses both, and one uses neither. Most users felt the current implementation of the network protocol was satisfactory. One user commented that he felt all local computers should be connected via NFS, so that all files would be available to all users. Transferring files is time and resource consuming, and the resulting duplicate storage is a waste of space.

How do you transfer files between any of the computers you use?

Six of the users use FTP to transfer data files from mainframes to their workstations. Two users use DECNET file transfers to bring data from the VAX to their VMS subnets.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

All users interviewed use the mail utility either locally or to off-site locations. Users have successfully transferred mail among and between VMS and Unix hosts.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, or sending and receiving mail?

Users stated that connections to mainframes can sometimes result in slow responses, erratic

reliability, and loss of connections. One user stated that connections with off-site computers were even slower and less reliable. A reason that one user set up his own subnet was his frustration with sending files between GP mainframes. He finds that the local network now works well, and that the local gateway to internet is working satisfactorily. A user expressed an interest in knowing how his connection was being routed.

Several users faced what they considered to be significant mail limitations. Anything besides VAX mail (VAX-to-VAX) was seen as having problems. A user felt from the experience of users on her subnet that the mail system is very erratic, and doesn't work consistently. They received a lot of returned mail, citing user unknown, domain unknown, or host unknown as a reason for the return. She conceded that the problems could be resulting from the way their mail utility is set up, and expressed a desire for access to help in reconciling the problem. She thus cited a need for accessible expertise in the area of subnet installation and operations. A workstation administrator was getting hundreds of errors from the mail host (AFGLSC) showing up on his workstation. As a result, he had to temporarily disable the mail utility to keep the problem from bringing down his workstation. He noted problems in sending/receiving mail to/from CD4360 and the Convex, and offsite users couldn't get mail to his workstation. Another user raised the issue of the inaccessibility of NSSDCA by mail. Internet hosts sometimes take days to receive mail sent from PL/GP, according to a user. A lot of people on his VMS subnet have questions about how to use the mail utility.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network? How far in advance would you like to know?

Only three of the workstation users found that they log into a mainframe often enough to find the login notices valuable. They felt that important notices should be e-mailed to all network hosts. They desire at least a week advance notice. Some suggestions given concerning notification: general meetings (now abolished) were helpful in disseminating information, login notices too cluttered with notices that concern only a few users, cataloging of old notices is done well now, put messages about UNIX working group meetings on the VAX, maintain and utilize an "all-user" distribution list whereby important notices could be sent to all users and hosts relatively easily.

What input do you have on changes that have already been made?

Users feel that NFS has been a positive change, although it has taken time to iron out problems. The move from central to distributed computing needs expertise in networking and monitoring. There should be an expert in SC on each type of computer that exist in groups at PL/GP so that each group can rely on SC help. In this regard, more training of SC personnel should be encouraged, and possibly other scientists doing internships in SC.

Some users said that PL/SC appears to be DEC-oriented, and should be more open-minded in acquisition. SC should be testing hardware, software, and network products rather than having scientists doing it. There is a need for more testing and researching of such products and for a master plan of computer system development rather than immediate responses to requirements.

Another concern is the elimination of VMS as an operating system on the VAX. Users desire to keep what they consider to be a user-friendly VMS in parallel with UNIX.

The users interviewed had a variety of inputs for PL/SC. The following sentences describe their views. Some common software on the VAX tends to get shifted to different disks on the VAX, so that the user cannot find it later when it is needed. Documentation must be maintained to inform the user of the location of the software. VAX output (especially line printer output of large code listings) be more accessible to users, and not have to go through operators. Purchase and maintenance of non-standard computer hardware and software has been difficult and very slow. As it is now, each division requires someone to maintain all of their equipment. Someone in SC should check (at least one per day) if the mainframes are up on the weekends. If they find they are down, they should have them brought up for users that depend on weekend computing. The PCSA implementation has been an asset, and the accompanying ability to use the VAX as a fileserver for PCs and workstations is a real help. Users would like the ability to go the opposite direction also - log in to the VAX and have access to files on the PC or workstation. People should buy their own local storage for their subnet, workstation, or PC, then make their local storage accessible on the network. Then anyone could access anyone else's data sets at their local storage device rather than maintaining a central file storage for all. The NEARNET network connection will be a most welcome opportunity for better remote file transfers and connections to remote computer. Having a competent in-house network specialist has been a big boost to the PL/GP network. The PL/GP mainframes should all run the same operating system (UNIX), because the dual operating system is a drain on computer throughput and increases overhead.

If you work on a PC or workstation that is a network host, would you want your host to be a distributed file service client - that is, have its files be default resident on a central file server?

Only two of the nine workstation users answered "yes" to this question. One of these users stated that as it exists now, NFS is only for the central site. It should be administered in such a way as to give each host's system administrator privilege over his own files, and give read-only access to all other hosts on NFS. This would avoid the problem of having to make separate copies of the data files in order to use them at his/her workstation. The other user interested in NFS would like a subdirectory that is an NFS client (where the "mount" is transparent to the user), while each system administrator maintains his/her own main directories. Under NFS, coordination between users is based on a numbering system for user numbers within a division. A "group" number is assigned at the division level. He would like to see separate group numbers to be assigned at the branch level. This would allow all users in that group to have equal access to files in NFS assigned that group number.

The users who answered this question "no" gave a variety of reasons. They like the independence of the subnet - they would establish client-server relationships at their subnet level. Through PCSA, we already have the VAX available as a file server. NFT seems to resolve the problem of access and use of binary files. Users are not confident that the other hosts (including the file server) they would depend on would be available, not to mention the concern about the reliability of the network. A possible use for distributed file service would be if we could get site licenses for IMSL routines and other applications on the UNIX mainframes, so that jobs running on workstations could access such routines "on the fly". A final possible use would be for the sharing of large data sets, which would avoid establishing several copies and unnecessarily tying up needed disk space.

How do you communicate with SC about your problems?

Almost all interviewed speak to the responsible person directly, either by phone or in person. E-mail to user services is used in routine questions and non-emergency situations.

Has the current method of problem solving by SC been effective for you?

All users interviewed were satisfied with the level of support they have received from SC. Some qualifications given were: they do well given their workload and manpower, would like a progress report if a solution takes more than a few days, the PC network has become too large for a one or two person staff,

most of the work is done by a very few people (so spread the consulting portion of SC over a larger group of people, that way more people can become experts to answer user questions, yet have time to work on their own projects as well).

Do you think a "help desk" (a single point of contact) approach in user services would be beneficial to you?

Only three of the users felt the help desk approach could be a positive step. It should not be just a referral service, but should be staffed by a person who could answer many of the questions and refer the questions he/she can't answer to the most knowledgeable consultant. The other six users prefer the direct contact.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

Five of the users haven't or generally don't see the newsletter. While on-line would improve readership, users still want access to hard copies.

2.5 PC Users

What Phillips Laboratory computers do you use? Why?

All PC users interviewed also use mainframes at least for administrative or file server purposes. Only one user uses the PC primarily for display purposes, having processed data on a mainframe. The other six users see their PC as their all-in-one computer, perhaps needing to rely on the mainframes only as file servers or for mail. The reasons given for this are several: the 25MHz 386 PC is powerful enough for the applications used; good for manipulating and examining data; acquisition of a Unisys-Desktop 3 PC avoided

the problems (response and downtime) I was having on the mainframes while allowing local control and availability of other nearby machines; used for scientific computing purposes; don't need the power of a mainframe; ease of use.

What computer applications (graphics, word processing, etc) do you use? What other applications would you use if available?

Currently used:

graphics: TEKSIM, DISSPLA and IDL (mainframes), personally developed graphics, PC graphics, Designer (Golden Graphics)

word processing: Microsoft Word, Wordstar, Wordperfect, XROFF and DECwrite (on AIMS VAX), Eve

other applications: Quattro (spreadsheets), Paradox (data base management), Charisma (desk top publishing), Ventura (desk top publishing), Autocad, DBASE (data base management).

Would use if available: print screen utilities (text to postscript file, then to printer), portable, User-friendly (editable graphics, ORACLE (on AIMS), government forms software for PC.

How do you currently access each of the computers you use?

All users interviewed either use PCSA through a terminal server to the ethernet, or have an ethernet board in their PC (so they are a network host). Terminal types include Z-248, Sony, VT220, and Unisys Desktop 3. One user maintains an Ungermann-Bass NIU connection to the network so he can emulate a Tektroni terminal on his PC.

Which network protocol (DECNET or TCP/IP) do you use? Are you satisfied with it?

TCP/IP is used by most of the users, along with some use of DECNET, LAT, and NFT, along with DOS copy.

How do you transfer files between any of the computers you use?

Some users use FTP between the mainframes and their PC, some use Network File Transfer (NFT) between VAX and their PC, some bring data files on CFSS to scratch space on VAX, extract segments of data, and bring those segments to PC via NFT, and others use DECNET file transfers for VAX to AIMS VAX.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

All users interviewed except one uses the VAX to send mail locally and internationally (the exception sends mail from his host PC to other hosts). One user stated that he composes the mail message on his PC, sends it via NFT to the VAX, then mails it from the VAX. Another user stages the message on the VAX, then sends it internationally using SPAN.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, or sending and receiving mail?

Users gave several statements concerning access to computers: local mainframes are sometimes difficult to access in mid-afternoons, connections are lost occasionally, very seldom can you get through to Military Personnel Computers (MPC) via Telnet yet they are required to do so at least monthly, ESD VAX is difficult to access and once accessed is very slow via TELNET (would like to be able to log in directly).

Concerning file transfer limitations, the users had these comments: occasionally will lose connections, speed is satisfactory, sometimes hit disk quota when transferring files to VAX (default disk quota is too low), file transfers via NFT between VAX and PC are great.

Mail utility limitations and comments: perceived problems in foreign nodes have resulted in a lot of

returned international mail, so had to resort to fax instead, network link between VAX and AIMS VAX down a lot, node address table in PL/GP VAX needs to be updated (GSFC host name changed, change should be made here), great difficulty in sending mail between PL/GP VAX and ESD VAX (haven't been able to do it at all, have been told several things by several people, but nothing works).

Have you used the on-line document "userinfo" on any of the mainframes? If so, please comment.

Two users had seen and gave comments on "userinfo". One user felt the document was satisfactory for a first look, but did not contain enough detail. Also, he felt that it contained too little information on networking and file transfers. The other user felt that SC plans and policy should be included in the document, and that a "change history" should be included for each entry in the document.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network? How far in advance would you like to know?

Three users felt it was important that they be notified directly (either through e-mail to their PC or be sent hard-copy) for reasons such as: they seldom log in to the mainframes, they supervise computer users and need to know, etc. The other users either are isolated enough from the PL/GP network to not care about being informed or they find that the login notices are satisfactory. Several users felt they need to be informed a week in advance.

What input do you have on changes that have already been made?

Users felt the login notices should be limited to one screen full, and unnecessary detail should be eliminated. They should be updated (old messages removed) more frequently. An idea given was to make it in the form of a table of contents, with the number indicating what number to key in to see more detail about that item. Include general laboratory information in the notices, such as notices of seminars, meetings, etc.

Data archiving issues: Central File Storage System (CFSS) may be overloaded when Cyber goes away, we need a uniform standard alternative media to tapes for data storage and portability, but we will need continued tape support in the future. There is a need for large amounts of disk storage.

Concerning networking issues, users had the following input. Several users commented on the need to make e-mail more user-friendly. It should let you know clearly and unambiguously why it failed when it does. We need a clear explanation of how to use mail available on each system, and have available to all users a comprehensive address book. There is a need for PL/GP to be a part of the Hanscom base e-mail system, especially for military officers. The username (last name and first initial) for each officer would be the reference used, and when base e-mail is sent both ESD and PL/GP VAXes are automatically checked and mail is sent to all such base mail usernames. There is a need for better documentation on utilities available on the network such as transferring files, submitting batch jobs, remote logins, and purge policy. "Userinfo" containing such information should also be available to people who use PCs only, perhaps through PCSA. The war for space on the VAX scratch disk continues. People have actually resorted to filling the scratch space with garbage to reserve space for themselves. Many users want short-term (same day) scratch space availability. They need a place to temporarily store large files from CFSS while they extract data from them. Weekly purges of the scratch disk has helped, but it may be that semi-weekly purges will be needed. Should be some way to check for abuse and penalize abusers. There is concern among users about problems that may result from making UNIX the operating system for all mainframes. It is important to keep VMS in order to support offsite and collaborating VMS users. There is interest among users for a generic X-window server for PCs (make it available through PCSA?) so that the user can run X-windows on his/her PC from any mainframe or workstation running X. Some users have acquired DR-DOS and are interested in modifying the network to support it. Users feel that the installation of Multinet on the PL/GP VAX has been a big improvement.

If you work on a PC or workstation that is a network host, would you want your host to be a distributed file service client - that is, have its files by default reside on a central file server?

The PC users that have PCSA are using NFT as a way of using the VAX as a file server for their PC. However, since at present their is an incompatibility between VAX binary and PC binary data, portability of data files is restricted to ASCII files.

How do you communicate with SC about your problems?

Two users routinely confront the responsible person face-to-face, while the other five send e-mail or call User Services. One person actually does both.

Has the current method of problem solving by SC been effective for you?

Generally, the PC users interviewed view the SC support as satisfactory. Some felt that turn-around on requests for help is sometimes to long, while others had seen same-day response. Two users mentioned the help they have received in setting up their PC and in networking issues. Another user found an inconsistency in answers among User Services staff.

Do you think a "help desk" (a single point of contact) approach in user services would be beneficial to you?

Four users either support the idea or basically use that system now by contacting User Services rather than specific people. They feel that most people don't know who to contact directly, and that the single contact person would eliminate confusion. The other three users prefer the direct contact.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

Five users felt it would be more accessible to them if it were on-line.

2.6 Cray-2 Users

What Phillips Laboratory computers do you use? Why?

In addition to using the Phillips Laboratory Supercomputing Center's (PL/SC) Cray-2, eight of the users regularly use the PL/GP mainframes (VAX, Convex, Cyber) as well as workstations and PCs. The other two users are off-site contractors who are under contract to use the Cray-2 and who use their company's workstation. Some reasons given for choosing the Cray-2 as their mainframe of choice were: large-scale model requires memory and speed of supercomputer, mass storage requirements have outgrown local (PL/GP) capability, fast turn-around, allows building of large data base, co-workers create needed files on Cray-2. The PL/GP VAX is used for some post-processing, file storage, tape processing, and transferring data, the Cyber used for extracting data from tapes and running some non-migrated FORTRAN code, and workstations are used for graphically displaying Cray-2 generated output. None of the users mentioned significant use of the Convex.

What computer applications (graphics, word processing, etc) do you use? What other applications would you use if available?

Currently used:
graphics: NCAR, DISSPLA, IDL (on workstation)

word processing (on front-end PC or workstation): EDT (on VAX), Wordperfect, Microsoft Word

other applications: self-developed math routines, IMSL, COMPRESS on Convex, EMACS editor, SLATEC on Cray-2, FLINT (FORTRAN code analyzer) on NCAR Cray, tape unpacking on Cyber, VECLIB.

Would use if available: conversion software between wordprocessing software packages, standard statistics package, Cray wordprocessor-type text editor, SPYGLASS and TeX on workstation.

How do you currently access each of the computers used?

Eight of the users access the Cray-2 through the PL/GP network, while two users use TELNET from their workstation via Internet. Of the eight PL/GP network users, two use PCSA on the PCs via a terminal server to the ethernet, four have Ungermann-Bass NIU connections which they use to log in to the VAX 9000, then TELNET to the Cray-2 or through a workstation to the Cray-2, and two have modems to access the PL/GP network, whereby they SET HOST to TCPGTE, and pass through gateway to Cray-2.

Which network protocol (DECNET or TCP/IP) do you use? Are you satisfied with it?

Seven users use TCP/IP exclusively, while the other three use a combination of DECNET (primarily "SET HOST") and TCP/IP. Most users are satisfied with the network protocol, with the following qualifications: TELNET is slow when connecting to Cray-2 via Internet; long-distance connections have been unpredictable; T-1 link problems have been resolved; would like to be able to transfer a list of files at once via FTP rather than one at a time; "bell" and "hash" modes of FTP are not recognized on Cyber or VAX.

How do you transfer files between any of the computers you use?

Most users transfer files from Cray-2 to VAX or workstation by means of FTP. This makes use of the T-1 link from Hanscom to Kirtland which users have noted has been working fine lately. Two users transfer files from Cray-2 to their workstation via Internet.

Do you send electronic mail between the various hosts on the PL local area network? Which hosts?

VAX mail is the predominant mail utility used, both locally and off-site. Some users have used e-mail on Cray-2, primarily to communicate with PL/SC consultants. International mail sent from VAX using SMTP is reliable.

What limitations have you faced recently in connecting to computers, transferring files between network hosts, or

sending and receiving mail?

Since the T-1 link was repaired in October, connections and transfers between Kirtland and Hanscom have been satisfactory. Some comments given were as follows. Availability of machines are limited due to cooling water shutdowns and maintenance problems, particularly on weekends when Cray-2 rates are cheapest. T-1 transfer rates are highly variable, getting at times as low as 8 kbytes/sec or less. When the T-1 link is down, there are presently no acceptable alternatives (DDN "TAC" doesn't work, modem can't transfer data). Because of the number of and frequent changes in the hosts accessible from the network, it would be good to have a matrix of current reachable nodes and available peripherals on-line. File transfer rates seem higher for transfers between workstation and Cray than between VAX and Cray. Our connections to the Cray are lost on the average of 2-3 times per week, with no explanations. In transferring large files to the Cray, our link is lost and we don't know if we have lost it - there should be a signal sent that the link has been lost. We have large ASCII data files that can take an hour or more to send. We can't successfully receive mail at our Sun workstation from another host, and our system administrator can't figure out why. We have sent mail to off-site locations and have gotten a message from the "postmaster" that attempts were still being made to get the mail delivered.

Have you used the on-line document "userinfo" on any of the mainframes? If so, please comment.

Six of the users said that they have used "userinfo" at least once. Several users did so because they were directed there in the login notices concerning Multinet use. Comments included: file protection and privilege on VAX should be explained, allow complete documents and excerpts from them to be printed out, more explanation about what utilities (for example a FORTRAN manual) are available as needed, helpful when kept up-to-date (UNICON version lags behind VAX version), Cyber version not needed.

In what way would you like to be informed of any decided or proposed changes to the central computer system or the network? How far in advance would you like to know?

Two of the off-site users who do not login to mainframes often requested that they be put on an e-

mail distribution list for infrequent users. Of the remaining eight users, only three found the login notices to be satisfactory for notification. One of them suggested that the login notices be reduced to "one-liners" with details given in a "news" document. Of those who find the login notices lacking as a means of notification, their suggestions included: e-mail of major changes and improvements; T-1 link down times are not announced, or was announced too late; not enough warning for some events (like network unavailability); there is a desire to hear about proposed changes long before they are implemented; too often, decisions are made spur-of-the-moment and are installed before we are asked for input; we don't feel we are in a position to change SC's mind - SC needs to allow time for reaction to a proposed change otherwise the users feel like they have no voice; login notices scroll by too fast to be useful to me. People who wanted to give input to proposed changes requested 2-3 months notice; for minor announcements, one week is enough.

What input do you have on changes that have already been made?

The following represents user inputs. CFSS has not lived up to its original billing as a long term solution to data archiving limitations. It got too full too fast. It is not sufficient for the long-term plan of eliminating tape storage. We need a long-term storage capability like that present (CFSS) at PL/SC. PCSA is a step forward. We need to push the idea of allowing PCs to directly access peripherals through PCSA. The commonality of operating system between the Cray and UNIX workstation is a great benefit. This should be true of all mainframes - make UNIX a standard. The PL/GP network is much stronger now. I am concerned about reading Cyber tapes (both binary and reclaim) after Cyber goes away.

How do you communicate with SC about your problems?

Six of the users contact user services by phone or e-mail, while the other four walk down and talk directly to the responsible person about the problem.

Has the current method of problem solving by SC been effective for you?

The users felt that the support they have received from SC has been generally helpful. They gave the following answers. Sometimes there are problems that they can't fix, so this is generally not their fault. Occasionally an inquiry is not responded to, although the SC group usually follows through pretty well. When I call downstairs and describe my problem to the answerer, I find that people seem busy and do not give clear answers. However, once SC understands the problem, it is usually resolved in a day or two. I have tried using the "help" person, but I found that they were unresponsive and that you had to prove that you had a problem. Direct contact with the responsible person was more effective.

Do you think a "help desk" (a single point of contact) approach in user services would be beneficial to you?

Seven of the users like or presently use the help desk approach. It is important to them that the person who takes their call or reads the e-mail message be knowledgeable and diligent to follow through on the query. It was suggested that this position be regularly staffed by contract so that if they didn't perform, they lost their contract. Two users preferred the direct contact.

Do you read the computer center newsletter? Would it be more accessible for you if it were on-line?

Three users said that they have seen it regularly. Most agreed that it would be more accessible (especially for reference) if it were on-line. Circulation problems could be eliminated if the user could print his own copy (or extract) from the on-line document.

3. SUMMARY OF USER INTERVIEWS AND RECOMMENDATIONS

3.1 Hardware, Software, and Applications

3.1.1 Hardware

The planned removal of the Cyber has resulted in users beginning to migrate to alternative computer systems. People with any UNIX operating system background have chosen to begin using the Convex, Cray-2, or a UNIX workstation. For many, this migration took place long before the announcement of the Cyber's non-availability beginning in FY93. They found that either their requirements had outgrown the Cyber's capabilities (Convex and Cray-2) or their frustration with the past inconsistency of Cyber availability (workstation) had forced their move. The inability of the VAX-9000 to do the promised vectorization of their large arrays have forced some to use the Convex when they may have more naturally migrated to the VAX. Some users are migrating to the VAX, particularly those who had some prior experience with VMS. Significantly, there were virtually no users interviewed who use both UNIX and VMS significantly. People have made their choice of mainframe or mini-computer based on preference for an operating system, their perceptions of whether the computer could handle their problem, or their data handling requirements.

Those users who have migrated to another mainframe have been generally satisfied with their choice. Even most people who rely primarily on workstations or PCs still use the mainframes for at least file server or storage purposes. Thus, the perceived move toward distributed computing is still in its infancy at PL/GP. This may change as workstations and PCs become more powerful and local disk storage becomes less expensive. Thus, there will continue to be a need for strong mainframe support of PL/GP users for the foreseeable future.

User concerns about Cyber tapes and their ability to use them in the future stood out from the interviews. Almost everyone who has ever used the Cyber has created or read tapes using Cyber-unique utilities. The uniqueness of the format of binary data on Cyber tapes is an issue to many Cyber tape holders. Tapes written with binary WRITE statements, direct access tapes BUFFER OUT, and RECLAIM format are all a concern. People are concerned not only with whether their tapes can be read by the alternative computer systems, but also whether the number of tape drives will be sufficient to handle their volume of tapes. A related concern is the emphasis on shifting from tape to alternative data archiving media, and whether that will be large enough and universal enough to handle all users' requirements for long-term storage and need for sending data to other centers. Users feel that there is a definite need for magnetic tape support here (primarily because they must receive and send data via tape) for the foreseeable future. They see a need for a clearly stated near-term and long-term policy statement concerning mainframes and data archival systems that will be available to users and how Cyber users should expect to use Cyber tapes in the future.

Not all of the migration from mainframes to micro-computers (workstations and PCs) is resulting

from a desire on the part of users to isolate themselves from the computing center. Users were able to give strong justification for their move to "local" computing, including the following: loads and slow turnaround on the mainframes, speed and reliability of the workstation or PC, compatibility with other scientists' computer environments, interactive graphics capabilities, need for local file server for large databases, and the need for consistent availability during nights and weekends.

While users do most of their processing on their computer of choice, they do rely on the other network hosts for data storage, electronic mail, and access to data archival (CFSS), as well as for pass-through to other mainframes. The vast majority of users interviewed regularly use more than one computer to do their job. Thus, the health and reliability of the communications links between PL network hosts is crucial to the successful completion of computer processing. Gone are the days of logging into a single, isolated computer without regard to any other system. Many users use one computer for graphics, another for "number-crunching", a third for administrative purposes, and still another for data storage. Users in general don't seem to mind transferring their files from place to place to accomplish these diverse purposes. However, it was pointed out that operations would be more efficient and several copies of the same file in several places would be unnecessary if a unified distributed file service was instituted in such a way that all users could use it.

It may be that some of the data storage, job turn around, and speed and memory limitations faced by several people interviewed could be solved by their migration to the Cray-2. Indeed, the Convex was originally envisioned to be the PL/GP "pre-Cray" computer, in which UNIX users would develop and test code on the Convex and run it in production on the Cray. More users have discovered the Convex and the load is now to the point where production users should seriously consider migrating to the Cray-2. Perceived hassles with paperwork are still hurdles that are keeping users from taking the step.

Recommendations:

SC should develop and distribute for comment a very clear and unambiguous policy statement and plan for the post-Cyber PL/GP network. This document should spell out when the Cyber will cease to be available to users, why it is being removed, what are the available alternative mainframes, where to go for help in migrating code and job control language to each mainframe, and what to do about Cyber tapes. In regard to tapes, the following should be addressed: (1) will each alternate mainframe be able to read each type of Cyber tape? (binary WRITE, formatted WRITE, direct access binary, RECLAIM), (2) if not, what should I do now to insure that I can read my tapes after the Cyber is gone? (for example, "bring an example

tape and a listing with dayfile of the tape job run on the Cyber to the Cyber or UNIX consultants), and (3) when should I begin my migration from the Cyber?

SC should commit to continued strong mainframe support for its users. Included in the aforementioned policy plan should be a "best guess" of what mainframes (and in what configurations) will be available at PL at least during this decade. SC should also commit to strong micro-computer support for both existing (maintenance) and new (acquisition) workstations, PCs, and peripherals. The interviews make it clear that the PL/GP network is made stronger and more diverse as it accommodates both mainframes and micro-computers. It may be less expensive for SC to promote (or at least support) micro-computer usage in the long run because it relieves the burden of heavy mainframe support. Now that the PL/GP network is perceived to be strong by many micro-computer hosts' administrators, it is in a position to provide strong support to them. The policy statement should include a section on lab-wide micro-computer maintenance and acquisition by SC - what users can expect.

SC should continue to expand and strengthen its communication links within the PL/GP network. Significant resources should be devoted to establishing and maintaining state-of-the-art communications equipment (cables, routers, bridges, ethernet connections, etc.). Since SC has already developed a plan for network growth and development, it should be included in the policy statement document.

SC should give serious consideration to making distributed file service network-wide. Partial domain examples of this are the NFS that couple the Convex, CD4360, and Sun Workstation 330 systems, and the NFT available between the VAX and PCs running PCSA. Long-term goals should include the capability to access a file on any network host from a central file server to avoid having to transfer it to that host. Only owners would have full permission for their files, while allowing read-only permissions for all unclassified files. This would eliminate a lot of need for duplicate file storage. Files not residing on the central file server would be their owner's responsibility as is presently the case. Hopefully, owners would see less need for establishing their own disk "empires" when they saw the availability and benefit of the central file system.

3.1.2 Software and Applications

The following table lists software and applications mentioned as currently being used:

Table 1 Currently Used Software/Applications

Graphics	Word-Processing	Other Applications
(on mainframes)	(on mainframes)	(on mainframes)
NCAR	EMACS	IMSL
IDL v.2	EDTC	compiler
TEKSIM	Vi	VECLIB
TEKSIMC		X-Windows
DISSPLA	(on micro-computers)	bit manipulation
Self-developed	TROFF	COMPRESS (UNIX)
P6LIB	TeX	SLATEC
	LaTeX	
(on micro-computers)	EXP	(on micro-computers)
CANVAS	Wordperfect	X-Windows
VTEK	Eve	Quattro

Graphics	Word-Processing	Other Applications
MATLIB	Mac Write, Draw, Paint	Paradox
IDL	Frame Maker	Charisma
PVWave	Mass11	Ventura
NCAR	Microsoft Word	Autocad
PHIGS	XROFF	DBASE
GKS	DecWrite	
Graphicus	XYwrite	
ISATEK	Mathematica	
Golden Graphics	Wordstar	

The following table lists software and applications mentioned as those that would be used if available:

Table 2 Desired Software/Applications

Graphics	**Word-Processing**	**Other Applications**
(on main-frames)	(on mainframes)	(on mainframes)
AVS (3.D)	Wordperfect	IMSL w/g flt.pt.
	LaTeX	IMSL (distributed)
(on micro-computers)	Mathematica	Fax capability
IDL (Sun)	Cray-word	ORACLE (on AIMS)
Spyglass (Sun)	processor editor	statistics package
AVS		
	(on micro-computers)	(on micro-computers)
	Word-processing conversion	postscript print-screen
	TeX (Sun)	government forms software

Recommendations:

SC should expedite the distribution of PCSA to all terminals, and then provide instruction on how each user's terminal can be customized to provide the desired word processing environment. This will probably reduce the demand for word processing capabilities on the mainframes, which is desirable in terms of cost-effective and efficient usage of mainframes (word processing is not what mainframes were made for).

What is not apparent from the tables is that workstation users do very little word processing on their workstation. Many have separate PCs to do their word processing. SC should encourage workstation administrators to consider acquiring compatible, standard word processing software for the workstation to serve their users' requirements. Then every user would have access to word processing capability on either a workstation or a PC. This would eliminate the need to have both, a workstation and a PC. Of all the mainframe users interviewed, only two VAX users and one Cray-2 user are regular users of DISSPLA graphics. Several former users told me they found it to be non-portable and not well supported here at

PL/GP. DISSPLA appears to be under-utilized here for the very expensive package that it is. SC should promote its use by sponsoring another DISSPLA training seminar in which (1) new local documentation on its use here at PL/GP is detailed, (2) PL/GP DISSPLA users would show DISSPLA graphics and describe their experience with using it, and (3) an SC DISSPLA contact person should be announced for user reference.

SC should announce (through login notices) updates to the way mainframe graphics packages must be used (how to compile, etc.). The updates themselves would reside in "userinfo". Hard copy options available should be described in the same "userinfo" graphics section.

SC should explore if single installations of graphics, word processing, math library packages can be used distributively (for example, a micro-computer user can use Mathematica, Frame-maker, IMSL, etc. on a distributed file server). This would save lots of money lab-wide in that multiple copies of the same package would be unnecessary. These packages could reside on the same central file server (for all users) recommended earlier.

3.2 Networking

3.2.1 Accessing Mainframes

There are two primary ways of connecting to mainframes in the current PL/GP network. They are: (1) for those with a direct ethernet connection, either through a terminal server or an ethernet card in their terminal (a network host), they can TELNET to the desired mainframe, (2) for those who still have the Ungermann-Bass "Net-One" NIU connection, they can "connect GL9000", "connect AFGLSC", or "connect CDCNET" (through which they can then connect to NOS, NOS/VE, Unicon, or CD4360). There are advantages and disadvantages to both. Those who have ethernet connections cannot do Tektronix emulation on their terminals because of an incompatibility between Tektronix emulation and the ethernet. However, they can use NFT to transfer files from the VAX (and presumably other PL/GP mainframes) to their PC. NIU users avoid the long "STARTNET" bootup on their terminal when they first log in, but must log in to a network host before they can get to another host or do any work on the system. Some off-site users use

modems to access the PL/GP ethernet, and report no systematic problems in doing so. Users whose terminals are not Zenith or Unisys find that the standard PCSA package is not fully operable on their terminal.

Recommendation:

Ethernet connections should be provided to all users on an expedited schedule. This coincides with the recommendation to provide PCSA to all terminal users. Before this is done, however, SC should resolve the apparent incompatibility between terminal Tektronix emulation and the ethernet. As the Desktop 3 Unisys PCs are installed, present Zenith Z-248 terminals should be used to replace Z-100 terminals. PCSA packages specific to other than Zenith and Unisys PCs should be made available to users who have such terminals.

If PL/GP really wants to promote the use of the Cray-2, then SC should make the Cray-2 a directly accessible host on the PL/GP network. Presently, all Cray-2 users must log in to some PL/GP network host and then TELNET to the Cray-2. PCSA users should have all mainframes (including Cray-2) as menu selections to which they can directly login (if only through the "other systems" menu selection). Since Cray-2 and USERVX are PL mainframes, they should be directly accessible to all PL users.

3.2.2 Connecting to Computers

A clear conclusion from the interviews is that the users consider the PL/GP network, and in particular their ability to connect to network mainframes, vastly improved during the past 12 months or so. One concern raised by several users was the lack of notification that their connection to another network host has been lost. This is particularly acute in file transfers (next section), but also is important in login sessions on accessed hosts. Users don't know if they have lost their connection, if the connection is just pausing, or if it is running a job and is waiting for input. Once a session is lost, the session is not recovered in most instances (the Vi editor on the UNIX machines will often let you recover an editing session), and their is no notification of non-recovery of the session when the person logs in again.

The network protocols TCP/IP, DECNET, NFT, and XMODEM are used widely at PL/GP. Users are generally very satisfied with their performance. Users connecting via TELNET (TCP/IP) sometimes noticed slowdowns in the response of the logged-in host, but couldn't tell if it was the network or the host that was responsible for the slowdown. Users have successfully used TELNET and SET HOST via wide-

area networks such as SPAN and INTERNET.

The "all GL9000 ports are busy" problem has been resolved. This had caused users to have to access the VAX-9000 from the VAX-8650. There were some feelings expressed that the longer the distance of the connection, the more vulnerable it was to being lost or slow. Several Cray-2 users commented that they lose connections as often as two to three times per week, without any explanation. They also find the T-1 link to be down ("network is unreachable") on average of once per week although the downages are now more short-lived. Another trend seen was the relationship between computer load (heaviest in mid-afternoons) and slowness of response. This prompted several users to call for more mainframe computer power, and others to wonder if this problem will grow worse after the Cyber is gone.

A major concern among military users was the inaccessibility of the MPC and ESD VAX computers via TELNET. Military people have been ordered to log in to the MPC regularly, yet about 80 percent of the time it proves to be inaccessible. Literally every Air Force officer interviewed stated that the ESD VAX is very difficult to access, and once logged in via TELNET it is very slow to respond. These limitations prohibit the officers from having the ready access they need to perform their mission. Though they have requested help in correcting the ESD VAX problem, the condition remains.

Recommendations:

SC should make information on the loss of a connection available to the user shortly after the connection is lost. This need be nothing more than: "Your connection to__ has been lost because_____, you can recover it by _____" (or "you can't recover, log in again later"). This notification should be available to all PL/GP network users.

SC should scrutinize all components of the T-1 link between Hanscom and Kirtland upon the installation of the terrestrial link. A PL/SC (Hanscom or Kirtland) network expert should be assigned the task of setting up and maintaining a system to monitor and report the performance of all aspects of the PL network. This responsibility should not fall on the shoulders of the user community.

SC should give high priority to correcting the problems of access to the MPC and ESD VAX. Instruction should be given to all military personnel on how to best access, transfer files, and send mail on these systems.

3.2.3 Transferring files

UNIX users predominantly use TCP/IP, and VMS users tend to use DECNET to transfer files. Many PC users access their files residing on the VAX via NFT. All of these modes have received high marks from their respective users. A few users transfer files with Kermit for this purpose, but report that this method is slow and not feasible for large files.

Most users felt that the speed of their file transfers was satisfactory. Cray-2 users noticed that transfer rates are highly variable and can get quite slow at times. Transfer rates within the PL/GP network are much faster generally than T-1 link transfers.

A practical limitation that arose many times in the discussion of file transfers was the limitation of local file storage space. Users experienced space limitations on both CFSS when they transferred files there, and on the VAX scratch disk when that was their file's destination. The six month (CFSS) and one week (scratch disk) policies have helped somewhat, but the latter has resulted in loss of files. The one-week scratch disk purge has motivated some users to use CFSS. There is still a "scramble" or "war" for space on the scratch disk. Users were at a loss to come up with a solution for this problem. However, there is a need for same-day storage of large files as they are transferred to - from CFSS and from offsite locations.

CFSS itself generated considerable discussion. Overall, people were satisfied with its recent performance. The three existing limitations mentioned were (1) it is overloaded, (2) not available from the VAX-9000, and (3) difficult to quality-control in the batch mode.

FTP generally drew praise and is used very widely in PL/GP. It has become more reliable in both interactive and batch modes. Some limitations noted were the inability of FTP to accept a list of files to be transferred, and that the "bell" and "hash" modes of FTP are not recognized on the Cyber or VAX.

For Cray-2 users, the T-1 link is the only file transfer option that is currently available. The DDN "TAC" gives "bad login" when an apparent valid ID and password are used. Users are not familiar with other options and expressed a desire to see a matrix on connect, file transfer, and accessible peripherals options that they could reach via the network.

Recommendations:

SC should present a clear and comprehensive discussion of the use of FTP and DECNET copy in

the "userinfo" document of each of its relevant mainframes. Further, with the installation of PCSA on each PC, SC should provide documentation for the use of NFT and other PCSA services.

SC should spell out its policy for same-day, short-term (6 months or less), and long-term disk storage for both the present and future. This should be a major entry in the SC policy statement mentioned earlier. In the mean time, SC should identify and define for the users the options for same-day (disk) and short-term (CFSS) file storage, and perhaps the best place for such a discussion is in a "file storage" entry in the relevant mainframe's "userinfo" document.

SC should identify and resolve the problem of accessing the DDN "TAC" link. Then those who use off-site computers and are registered DDN users can have another option for off-site computer access.

3.2.4 Electronic Mail

Use of electronic mail (e-mail) varies significantly from system to system. Convex users are virtually non-users of e-mail on the Convex (four users use other systems for e-mail). On the Convex, the notification "you have mail" appears before the login notices and the whole thing scrolls by so fast that most of the time they don't know they have mail to read. By contrast, the VAX "beeps" and pauses on the mail notification line, so the user is duly notified. On the VAX, all users interviewed use the mail utility. Another reason that people don't use Convex (or in general, UNIX mail) is that they had learned VAX mail as their only e-mail option at PL/GP, and stuck with it. Indeed, VAX mail is by far the predominant single mail utility used at PL/GP for users of any PL/GP computer system.

Workstation and PC users report that they have been successful in sending and receiving mail on the micro-computers. This applies to both local mail (to other PL/GP hosts) and off-site mail (using SPAN or INTERNET). Interestingly, all but one PC user interviewed choose the VAX to send mail locally and internationally, while the other PC user and most workstation users said they use their micro-computer for this task. This is probably due to the fact that most PCs are not network hosts (that is, they do not have IP addresses) whereas most workstations are. The PCs are predominantly on terminal servers on the ethernet. Therefore, they have to transact their mail on a network host, and the VAX is the overwhelming favorite.

While no systematic e-mail limitations surfaced in the interviews, many independent problems

were mentioned. These may be categorized as: (1) inability to successfully send mail to certain off-site hosts, (2) past local e-mail conflicts that have not been fully resolved since they are seldom encountered (esoteric sender-receiver pairs), and (3) lack of knowledge on the part of the user about e-mail.

A number of users expressed a significant need along with a high level of frustration in sending and receiving off-site mail. The most common concern stated was an inability to transact mail with specific long-distance nodes (NSSCDA in Italy and GSFC in Maryland were mentioned). They find that they are unable to send, get unclear return (error) messages, and don't know whether their mail was really sent. Their returned mail contains such messages as user unknown, domain unknown, or host unknown and they don't know how to begin to correct the problem.

Some workstation users also found that they were not receiving off-site mail, and in many cases this would result in a flood of error messages from the mail host (AFGLSC). Several users found that while they could send VAX mail off-site, they could not send VAX mail to the Convex. One of these users couldn't reply to a mail message he received on the Convex. Another user couldn't transact mail between his UNIX workstation and the Convex or CD 4360.

Stimulated by the apparent inconsistencies of the PL/GP local e-mail system mentioned by users, I conducted a test of e-mail between various PL mainframes, workstations, and a single off-site host. The results are given in Table 3 below.

Table 3 **Electronic Mail Evaluation Matrix**

FROM: TO:
(HOST ADDRESS) (HOST NAME)
+ denotes successful transfer, - denotes transfer failed

	CD4360	CHARNEY	CRAY2	PLH	PL9000	AER.COM	SPARCY	UNICON	USERVX
CD4360.PLH.AF.MIL (146.153.100.30	+	- (1)	+ (2)	+	+	+	+	+	+
CHARNEY.PLH.AF.MIL (146.153.24 2	+	+	+	+	+	+	+	+	+
CRAY2.PLK.AF.MIL (129.238.228.2)	+	-	+	+	+	+	+	+	+
PLH.AF.MIL (146.153.100.10	+	- (4)	+	+	+	+	+	+	+
PL9000.PLH.AF.MIL (146.153.100.9)	+	- (4)	+	+	+	(+)	+	+	+
AER.COM*	+ (3)	-	+	+	+	(+)	(+)	(+)	+
SPARCY.PLH.AF.MIL (146.153.100.15	+	+	+	+	+	(+)	+	+	+
UNICON.PLH.AF.MIL (146.153.100.7)	+	- (1)	+	+	+	(+)	+	+	+
USERVX.PLK.AF.MIL 129.238.32.4	+	- (4)	+	+	+	+	+	+	+

(1) From:Mailer-Deamon @ charney.plh.af.mil, Subject:Returned mail:Service unavailable
(2) Returned mail:user unknown, norquist @ cray2.plk.af.mil (had to use u2513 instead of norquist, then it worked OK)
(3) From:Ron_Isaacs @ mailgate.aer.com
(4) Returned mail: Unable to deliver mail...Mail loop detected, sendall:too many hops (30 max) From: Mailer-Deamon @ charney.plh.af.mil
(+) Transfer assumed to be successful due to successful to or from like hosts.

Address syntax: UNIX hosts: username @ hostname.plk.af.mil; VMS-PLH hosts: SMTP% "username @ hostname.plk.af.mil"; USERVX: WINS% "<username@hostname.plh.af.mil>"

*located at AER, Inc., Cambridge, MA
+ located in PL/GPAP, Building 1102C, Room C 220

It is clear from these recent results that e-mail concerns raised in the interviews have been largely resolved. Thus either the problems really did exist and were fixed, or the users did not know how to transact e-mail, or both.

Lack of user knowledge about e-mail (how to send, receive, reply, print out messages, delete messages, set up their own system on the workstation, subnet, or PC, dealing with returned mail and the inability of people to send mail to you) is a concern among users. There are a lot of questions about e-mail, and it is clear that many of the doubts about the efficiency of the PL/GP e-mail system (and some remaining problems) would dissolve if users were properly trained.

Recommendations:

SC should conduct an "E-mail Workshop" in the very near future to both train and hear from users. The workshop should be advertised widely (login notices, paper copies sent to all branches) and well in advance. Topics covered should include:

E-mail for the administrative user
Hanscom e-mail (ESD, PL, ABG, and RL)
VMS e-mail (local and off-site)
UNIX e-mail (local and off-site)
How to transact PC and workstation e-mail
How to set up a mail utility on a subnet, workstation, or PC
How to deal with returned mail or problems
with people sending you mail.

SC should provide the appropriate hard copy handouts for each of the above topic areas at the workshop. In addition, this would be the ideal time to provide a comprehensive list of mail addresses of all PL/GP hosts, POCs for each, and telephone numbers. The same should be true for commonly used off-site hosts (solicit user input for this one). A diagram explaining how mail is routed in the PL/GP network (explaining such concepts as mail hosts, mail server, mail domain, etc.) should be provided.

SC should work to establish a viable Hanscom-wide e-mail system that allows all military personnel with computer accounts to simply send VAX mail to any other user without logging into that user's computer. ESD distribution should include PL/GP military users independent of the difference in mainframes.

SC should include this same information in the e-mail entry of "userinfo" on each relevant PL/GP mainframe. A copy should be provided with each PCSA installation or service call, and to each new PL/GP computer user.

SC should commit to giving high priority to users' e-mail problems as they arise. Action should be

taken as soon as possible to assist the user in solving his/her problem.

SC should put the e-mail notice line on UNIX mainframes after the login notices.

3.2.5 Distributed File Service

As mentioned earlier, PL/GP has two existing forms of distributed file service. SC has linked the Convex, CD4360, and Sparcy (Sun 330 Workstation) in a common file system made with the CD4360 acting as the file server and the Convex and Sparcy the file clients. Therefore, whenever a user logs into any of the three computers, he has common access (in his default directory) to any file created on or transferred to any of the computers. The other example is the way PCSA allows the PC user to access files on the VAX without having to transfer them to his/her PC.

I asked both workstation and PC users to comment on the concept of distributed file service and whether or not they saw something from which they could benefit. There was a lot of interest in the concept of software and applications (such as IMSL) available on a central network server that they could execute (without transfer) on their own micro-computer.

However, quite a different attitude surfaced when users were asked if they would want their micro-computer to be a file client of a central file server. Only two of the nine answered "yes" to this question. In general, the users who answered "no" generally have attempted to become independent of the PL/GP network and would be more interested in establishing a file server/client system in their subnet. The basic concern about depending on a PL/GP file server is: will the network (and/or the file server) be there when I need it?

Recommendations:

SC should exhaustively detail its plan to move to a distributed file service system in its policy statement. The plan should describe in detail how the system will work from the user's point of view. It

should consider what contingencies are possible when all or part of the network is down. Here is an opportunity to allay the concern of subnet/system administrators about continuous availability of their files. The plan should also discuss the file permissions and protection that will be implemented by default. SC should invite and seek out feedback from users (especially system administrators) on the distributed file service plan before any further future commitments are made.

3.3 Documentation Notification, User Input

3.3.1 Documentation

SC has shown a commitment to move to on-line documentation of PL/GP site-specific applications. The "userinfo" document is the flagship of this effort. Yet it is clear from the interview results that "userinfo" (1) is not widely used, (2) is seen as a help largely for new users rather than a reference for present users, (3) is inconsistent in its depth and coverage of applications between the mainframes, and (4) is not available to users who primarily rely on workstations or PCs. In fairness to SC, "userinfo" must be considered to be still in its early stages of implementation. Many of the hard-copy documents available at SC have yet to be included. Amazingly, many users did not know of its existence. Clearly, many users ignore or "turn off" the login notices (which have clearly told of and even suggested the use of "userinfo").

Like any other reference document, "userinfo" should be readily available, comprehensive, and easy-to-use. SC has succeeded in accomplishing the first and last of these objectives for mainframe users. As mentioned earlier, SC is still in the process of developing a more comprehensive document. The "manpages" on UNIX hosts and VAX-help on VMS hosts should answer general operating system command questions. The "userinfo" document should describe such issues as how to use IMSL, compiling and loading programs, tape handling policy, how to use NCAR, DISSPLA, TEKSIM (and other) graphics, file purge (scratch disk and CFSS) policy, e-mail, and so on. The documents should be mainframe specific. This may mean only slight differences between the CD4360 and UNICON versions, but where differences exist, they should be delineated. Appendix A gives a list of current entries for each mainframe and some recommended additions. "Userinfo" should be kept up-to-date so that user confidence in its relevance is maintained. Several users

desired to see a dated "change history" maintained for each entry. When a change is made to any entry, a one-line login notice should be entered to alert users.

The "userinfo" utility should allow the user to print or create a file of any entry or portion of an entry on each mainframe. The file creation option allows the user to then print his/her file at the printer of choice, rather than the default printer. This meets the request of those users who much prefer hard-copy documentation, which is so much harder to keep updated and more difficult to distribute.

The longer entries of "userinfo" should include a table of contents so that the user can move directly to the section he/she is interested in. Also, if possible, each "userinfo" document should include a "keyword" feature which would list all entries that include that keyword.

Recommendations:

SC should commit significant resources to implementing the suggestions given above regarding "userinfo." SC should move "full speed ahead" in migrating away from hard-copy documentation and toward user friendly (and printable) on-line documentation.

SC should advertise the exis nce of and its commitment to on-line documentation. This could be done through : (1) inclusion of the on-line documentation migration plan in the SC policy statement, (2) login notices, and (3) a promotion letter (one-page) sent to all branches and available at SC workshops and seminars.

SC should consider what could be done in PCSA to include a "userinfo" document for PCs.

3.3.2 Notification

Most users interviewed felt that the concept of the login notices was a good one, and that if done properly would satisfactorily inform most users. However, there was also a clear consensus that the login notices have been too lengthy (too much detail). The practical implication of this that the users don't bother

to read them, either because the scroll by too fast or they are in a hurry to start computing. Many users felt that the notices would be more effective if they could all fit on one computer screen. This would necessitate restricting each notice to one or two lines, and no longer than a five-day duration. "BLAST" has been offered as a solution to the scrolling of the notices on the VAX - however, users don't want to bother with it, and if they don't see a message they think is important, they wouldn't use "BLAST" anyway. Forcing the login notices to fit on one screen should meet the concerns of those who find them too hard to read (and said they preferred hard copy).

The consensus was that notification of availability of the system and new applications requires only about a week advanced notice, while notification of proposed policy change should allow at least a month lead-time, and should invite user feedback. There seem to be enough infrequent mainframe users to consider some form of electronic notification for PC and workstation users.

Recommendations:

On each mainframe, put a "frame" around the login notices, and put them just before the system prompt (except for the UNIX mainframes, where the e-mail notification immediately precedes the system prompt). Make sure the frame is no larger (preferably several lines shorter) than a screen. As the last line in the frame, include the words "For details of these notices, type 'notice'". Then include the "notice" utility on the other mainframes as it is implemented on the VAX (reverse chronological order).

SC should maintain the login notices and the entries in "notice" regularly, removing any from the login notices that is more than five days old, and removing any obsolete entries from the "notice" utility.

SC should explore means of notifying PC users, workstation users, and users who infrequently use the mainframes. This may include developing an e-mail distribution list of such users, and sending weekly *notification. There are a significant* number of such users and their needs should be served. Another easier method would be to campaign for all users to log in to a mainframe at least weekly, although this method is less fool-proof.

3.3.3 User Input

Users gave favorable comments to a number of changes, such as the migration of TEKSIM to newer mainframes, the increased reliability of the network, the implementation of PCSA, and the installation of Multinet on the VAX. Users also gave suggestions and raised concerns about present and proposed policy, and about what they see may be shortcomings in SC operations.

Perhaps the most commonly expressed concerns centered around short-term file storage and long-term data archival. Users generally were not opposed to the general trend away from magnetic tapes and toward other data transfer and storage media. However, they are concerned that the present short-term storage policy isn't working and about the amount and type of long-term data archival. Competition for space on the VAX scratch disk may call for a change to "same job" (files go away when user logs out or batch job ends) or "same day" policy. More benefit to users may be attained by seeing the scratch disk as a step on the way toward final storage in an archival system (CFSS, tapes, etc.) or as a staging area in extracting data from archival media before it is shipped elsewhere or portions are extracted from it. To minimize the scratch disk overload, users see a need for more support of running batch jobs that involve CFSS. If the current scratch disk policy is maintained, users see a need for substantially more short-term disk space to unload their tapes, optical disks, and tape cartridges on their way toward local archiving of their large data sets. Users acknowledge the need for a long-term data archival system to replace the current tape system, but call for the continued support of tape reading, writing, and limited storage of tapes in order to support other centers. The big question is: what will be the capacity and media-type of the next PL/GP long-term data archival system, and will it be large enough, reliable enough, and automatic enough to serve anticipated user needs? Some users felt that data storage would be better distributed around the network (users buying their own storage) rather than residing in one central location.

Another popular topic of input was the present and planned operating configuration for the VAX. The first major issue was the planned migration of the VAX-9000 to the UNIX operating system. Many VAX users felt that this move may be unwise because: (1) VMS is a more user-friendly operating system than UNIX, (2) it would require a lot of extra conversion of job control language in command procedures, and (3) the VMS capability will be required for exchange of data with other VMS computer centers. The second major issue was the problems involved with using large-vector software on the VAX 9000. Page limits are frequently encountered when running such software, and this points out the need for virtual memory. A major selling point of the VAX-9000, the vectorization of large loops, is still not working and is resulting in less-than-optimal throughput in long-vector applications. Finally, several users called for a change of password expiration policy on the VAX so that they can still login (to change their password) after their password expires.

Some users felt that they have not seen any concrete master plan for network configuration for the

1990's from SC. They wonder if they can put the manpower and resources in migrating to a new mainframe, and then count on that mainframe and its operating system to be available to them for the next 5-10 years. Others felt that SC should be providing more support in acquisition, training, installation, and maintenance of workstations and subnets located around the laboratory. Subnet and workstation users are becoming a growing part of the PL/GP network, and most of these users are still dependent on the network support they get from SC to make their systems work. Some of them have felt that they have done much of the product testing and research themselves, and would like to see SC play a bigger role in pre-screening products and recommending potentially useful product to users.

Other important topics that surfaced during user input were:
(1) weekend access to the mainframes on the network and the need for SC to monitor this and re-start the mainframes if necessary, (2) ability to run graphics applications in X-windows on the mainframes and view them on an X terminal, (3) who is really benefitting from NFS on the SC UNIX hosts and if this should be extended to other UNIX hosts on the network, (4) is there still a need to have combined users groups meetings to discuss issues common to all users?, and (5) which applications are really being used on each of the mainframes (have we bought too much software for the VAX?).

Recommendations:

SC should sponsor regular (semi-yearly?) "vision" meetings to detail their near and long-term plans for configuring the network. All users should be invited well in advance, and should be solicited for their views and feedback. During a portion of the meeting, SC should distribute a short survey on important topics to get input from the users for in their decision-making process. During the "vision" meeting following the SC - scientific division planning meetings, SC should outline what they heard from the division management and their plans to accommodate them. This supplies a helpful "check" to SC, that they have interpreted the divisions needs correctly. Discussion at such meetings should be confined to future plans and the explanation of them, inviting immediate or short-term user reaction (it should not degrade into a status quo "gripe session"). Included in such "vision" meetings should be presentations by SC of plans for solving some of the problem areas mentioned by users as discussed in this section. SC should document all user input during and after the meeting, then include this in their next meeting's "old business" along with any action they took (or didn't take) and why, and a description of what plans have been implemented since the last meeting.

3.4 User Services

3.4.1 Communication with the User

For the purposes of this document, we will refer to any SC staff that are concerned with user assistance as members of "User Services". A clear outcome of the interviews is that virtually all users interact with "User Services" at least occasionally. Thus, support from User Services is vital to progress and productivity of the typical PL/GP network user.

Users avail themselves of all forms and methods of communication with User Services. From the interviews, it appears that the most popular method is the face-to-face contact with the User Services person the user feels is most responsible for his/her problem area, followed closely by telephone or e-mail contact with this person. There are a variety of reasons given for this, but they may be summarized by the perception that users feel their problem will be given the highest priority if posed in this manner. There is significant doubt that a message (verbal or e-mail) is going to get to the right person in a timely manner (or ever) unless he/she does it himself/herself. Several users expressed the frustration of being passed from one SC support person to another, having to re-explain the problem as they go. In this case, it is no wonder that they make a "mental list" of what person handles what problem, and then address the appropriate person directly the next time.

For the more shy or less intense user, contact with User Services by e-mail has generally proved satisfactory. This way, the "passing" of the question is done without the knowledge of the user, sparing him/her the grief. For those in this category who want to make sure their question is heard, the users can (and some do) call User Services by phone.

The majority of users interviewed prefer the present "varied modes of access" approach to User Services (including the direct approach to an individual) to the "help desk" approach. The users that do contact User Services by phone or e-mail are essentially using the "help desk" approach now. This would include new users who do not know a specific individual to talk to.

Recommendations:

SC should put their contact list (including "User Services") of individuals names, phone numbers, and e-mail address on-line. The individuals listed should be categorized by area of support they provide. User Services staff should use the same list for their referrals. Primary and alternate persons responsible should be included for each type of support. Hard-copies should be made available to all present and new users. The on-line version should be updated regularly and a login notice should be posted each time the document changes. In this document, users should be encouraged to contact User Services for initial consultation requests, and the specific person who helped them in cases of follow-up consultation requests.

3.4.2 Effectiveness of SC Support

Most of the users interviewed felt that the assistance that they have received from User Services generally has been helpful. They find that the User Services personnel display a responsive and receptive attitude to their questions and concerns. For a majority of the users, the User Services support is accessible and available most of the time, recognizing that the person they want to talk to is not always going to "be there" when they need them. Though a few isolated cases of non-response or slow (several days or more) response were reported, most users stated that their problems were addressed the same day or the next day.

One common feeling already mentioned in Section 3.4.1 was the concern about being "passed around from one person to the next". Another area that surfaced from the users was the problem of dealing with foreign tapes. They expect that User Services will know more about the issue when it is first discussed, and users find that in the end they find the solution themselves then wonder why User Services didn't solve it earlier for them. This also applies to other esoteric problems such as bit manipulation and subtleties of some of the graphics software (DISSPLA or NCAR, for example). Two new users would have preferred to have one User Services person take them through the whole procedure of getting a fully successful user account started, rather than being "passed around" and ending up with an unsatisfactory account initiation (which they have yet to get resolved). Another user represented the sentiment of many when she stated that she felt that the User Services staff should stay better informed on what problems their colleagues have solved/worked on so that they do not duplicate the effort. Another suggestion echoed by a number of users

was that the User Services person contact the inquirer with a progress report if the solution takes more than a few days (for whatever reason). Also, the user would like to know sooner rather than later if the problem can't be resolved soon, so he/she could design a "work around" to the problem.

Recommendations:

User Services should routinely use the contact list as a guide for referral of questions to a specialist, so that a user is "passed only once.

User Services should also develop a system of cataloging solutions to user problems to avoid duplication of effort. This may involve asking User Services staff to keep an electronic file of new problems encountered and their solutions, then making an in-house SC person responsible for collecting, editing, and cataloging these and making the catalog available to User Services for reference.

SC should designate a single point of contact for all new user accounts. This person should use a SC-developed checklist to track and document the process of the user gaining access to all services he/she needs. Also included in the process should be a follow-up contact with the user after one week to see that his/her account has been established successfully. SC should see that User Services personnel contact users in cases where the solution is expected to take more than 2-3 days.

3.4.3 Computer Center Newsletter

A clear result of the interviews is that the quarterly Computer Center Newsletter is not seen by a majority of the users. Most users felt this could be corrected to their satisfaction by putting the newsletter on-line. Some users strongly preferred hard copy for two reasons: (1) on-line is hard to read, (2) they don't always log in to mainframes.

Recommendations:

Since the interviews were conducted, SC has taken the step of putting the newsletter on-line on the VAX. SC should make the newsletter available to UNIX users as well by putting it on the Convex. In the "one-liner" login notice, SC should state parenthetically that hard copies of the newsletter are available in the User Services area (or other designated location). Also in the login notice, SC should include what period the current newsletter covers (for example, Winter 1991 or Oct-Dec 1991).

4. REACTION TO USER INPUT BY PL/SC

4.1 Introduction and Comment

After the foregoing summary and recommendations were written, the following questions were put to the indicated SC/User Services personnel. The order is important here because I did not want my summary and recommendations based on user input to be influenced by SC/User Services responses. That is, I wanted to objectively present the users'input without being influenced by SC "realities". At the same time, I wanted to be able to use my summary of the user interview responses to formulate the questions put to SC. As I asked the following questions of the SC/User Services staff, I noticed a keen interest in "what are the users asking?" I took this as an encouraging sign, in that it indicated to me their desire to provide valuable service to the users. I also sensed a feeling of camaraderie among the SC/User Services staff in two ways: (1) as I asked questions, several people came in to give their support to the person being questioned, and (2) several mentioned their dependence on others in the SC/User Services staff in arriving at joint decisions/policy/service. There is a clear sense of delegation of duty and common respect for the duty and competence of their fellow SC/User Services staffer. This should be reflected in the way they cooperate with each other to provide service to the user in the future.

The responses of the experts interviewed in the following section contain many of the "tools" with

which to implement (or findings that they have already been implemented) the recommendations given in the previous section. It now remains the responsibility of the users to see that the ideas that are important to them are implemented. This requires the user to let his/her voice be heard. This can be done by contacting ISAC representatives, SC/User Services staff, mobilizing fellow users, or simply sending e-mail to User Services. These are not new suggestions, but this report recommends them as the most important management controls needed to ensure that recommendations users care about are followed. SC/User Services has shown through the following responses that service to the user, even anticipating user needs, is important to them. It is my wish that this study not be used as a stick to make sure that SC "toes the line", but instead as a reminder to the users to continue to openly promote their computing requirements.

One user suggested that scientists occasionally participate in short-term assignments in SC to attempt to lend support and progress to SC projects for which they can derive long-term benefit in computing support. I heartily endorse this recommendation, for I feel that through this assignment I was a chief beneficiary in learning more about the PL/GP network and how it is used. It has given me tools to use in my scientific effort that I might have otherwise not had.

4.2 Results of the SC Interview

How should users who have Cyber tapes migrate their tape reading and writing requirements to the CD4360? (Partridge)

The first step is to acquire a UNIX account (see Harry Chin) if the user does not already have one. Next, the user should transfer (by FTP) source code for each type of Cyber tape job (reading or writing) to the CD4360 and begin the process of modifying the source code to perform the same function on the CD4360. Some Cyber source code is not allowed (FORTRAN 4 that was not extended to FORTRAN 77, READMS, WRITMS, BUFFER IN, ENCODE, etc.) and would have to be modified. At this point, User Services (John Partridge) can be consulted for help, and the UNIX "man" pages (on-line documentation) can be used. Finally, the job control language to mount the tape would be included in the shell script used to run the job. The output from the run can be compared with that from the Cyber job to validate the success of the migration.

What is the SC policy on assistance to micro-computer and subnet users in acquisition, installation, and maintenance of their hardware and network tools? (Smith)

Acquisition: SC will have information on the Desktop IV (PC) and SEWS II (workstation) contracts that they can make available to users. See Judy Greco or Will Madore for that information, and about the qualification requirements. From that point on, the user is responsible for the purchase.

Installation: SC has helped in installation, and would like to continue providing assistance but can only do so in a limited capacity due to shrinking staff. If enough users feel SC help is needed, SC could develop such a position but it would necessitate making room in the budget for it. The user is advised to do as much as he/she (or the vendor) can, and SC will help when possible.

Maintenance: SC will recommend that PL/TO group all like workstations under the same maintenance contract. Users who have such contracts through TO will be covered in this way. Users without maintenance contracts for their hardware must initiate this through PL/TO and will be added to the group contract.

Is it feasible to extend NFS to include all hosts on the PL/GP network? What does the workstation/PC user have to do to make this a reality on his/her workstation/PC? (Trimboli)

PL/SC has decided to provide NFS network-wide. They are evaluating several software packages for PCs to do file serving. One the decision is made, this package will be installed on PCs. For some PCs, this may necessitate changing a card in the PC. Next, a user would have to apply for an account to use NFS, and for now would make a choice for either UNIX or VMS. The UNIX system is called NIS, which allows host tables to update centrally - the user doesn't need to. After this, his/her files can reside on the file server, which provides the benefit of not having to backup files (this will be done centrally) and not having to transfer files to the PC. Workstation users would have to come to User Services (Mike Trimboli) to have their workstation configured for NFS after applying for an NFS UNIX account. Issues involving access to files in case of failure of network or fileserver will be addressed in the near future. Recommendations will be made to put the network and the file server on the uninterruptible power supply, and to establish a backup file server if the primary file server fails. Practically, the more user demand for use of NFS on their terminal, the more likely that such backups will be put in place.

What is the timetable for migrating all terminals to the broadband ethernet? Will PCSA (or its equivalent) be installed with each terminal reconfigured? (Cavallaro)

"Dumb" (asynchonous) terminals (such as Z-100's) require a NIU. These will not be replaced until they become inoperative. At that time if the user continues to require only a "dumb" terminal, it is the responsibility of SC to repair or replace their NIU. As such terminals are deemed to be insufficient for user purposes and the user initiates the replacement with a "smart" terminal (such as a PC or workstation), direct ethernet connections will be made available by SC through a "Chipcom" connection via a terminal server or an ethernet card in the terminal. In such cases, SC can provide PCSA (or equivalent) software.

What can be done to make Tektronix emulation fully successful on a terminal on the ethernet? (Partridge)

PCSA software does not support Tektronix emulation, as many users have found. For this reason, the unfortunate reality is that separate software will have to be acquired for smart terminals (PCs) on the ethernet. In addition, this software package will have to be compatible with the ethernet board in the PC. SC should identify such software for the PCSA terminal users and notify the users of its availability. SC should explore the possibility of a group purchase of the software for all users who express a interest, where the user's division is charged for the purchase. One by one, the NIUs are becoming inoperable and SC should cooperate with the user to eliminate the reliance on the NIU for Tektronix emulation.

Can applications such as IMSL, NCAR graphics, and Mathematica be made available to jobs running on workstations through NFS? (Trimboli)

This has been done to a limited extent already. NCAR graphics and TEKSIM reside on the NFS file server (CD4360) and can thus be accessed from any other NFS file client as libraries specified on the compile line (see Graphics_NCAR or Graphics_TEKSIM on UNIX "userinfo"). These applications (and others that users would like to add-see Mike Trimboli) are in the NFS directories /SC1 and /SC2. Users are encouraged to participate in developing this joint resource, and thus avoid the duplication of applications software. Any user considering the purchase of an application for their workstation should talk to Sandy

Smith before buying it to see if NFS installation is a possibility for that application-this way a single purchase can make it available to many users.

What would have to be done to include the Cray-2 and USERVX as directly accessible hosts on the PL/GP network without having to log in to a local host first? When could this be done? (Rosata)

Workstations that run TCP/IP can do this now. Terminals that have ethernet connections running LAT: connect TELNET, then open Cray 2. Smart terminals that run TCP/IP can do this now. PCs that have PCSA would have to await the file serving software installation which will have TCP/IP as a part of it. For dumb terminals, more hardware would have to be acquired for this to be possible. Under PCSA, PC users can select the TCPGTE menu selection, then at the log in prompt type: Cray2.plk.af.mil! or uservx.plk.af.mil! and log in to the relevant mainframe. To have a "seamless" connection to these PL-Kirtland hosts, they would have to be put into the local host nameserver tables. Until now, they have not been considered local hosts, and maybe they should be since they are PL hosts.

Is it possible to inform the user immediately of the loss, reason for loss, and recoverability of his/her TCP/IP connection? (Dorosz)

Under the current implementation of TCP/IP, there is no mechanism for automatic notification to the user of the loss of his/her session. Some implementations have this, though ours does not. However, there are things the user can do to monitor the status of his/her session. In TELNET, the user can type <CNTRL>] to enter the TELNET command mode, then type "status" and the response will be the status of the connection. Your TELNET connection will be preserved. IN FTP, one can use the "hash" command to enable the printing of # signs to indicate the transfer of the file. As long as # signs continue to appear, the user can be assured that his/her connection is operating. "Status" will work in FTP only as long as the session is active so it won't be useful to check and see if a connection has been lost.

What new resources can the PL/GP user expect to see in the near future for short-term (disk) storage and long-term data archival? (Dorosz)

The current plan is to acquire "Unitree" file migration hardware that will be a part of the PL/GP network. The "location" of the migrated file will be transparent to the user. As the user accesses the file, it will be migrated back to his directory automatically, either from a short-term storage stop (probably a magnetic drive) or if the file hasn't been accessed in a longer time, from optical disk. As optical disks get filled, it is possible that it will be necessary to dump files to some form of tape storage, which will require human intervention. In this case, it would be necessary for the user to notify operators to restore such a file - it could not be done automatically.

What are the hurdles that stand in the way of a fully successful link between the PL/GP and ESD-ABG computer networks here at Hanscom? Are there plans to overcome these hurdles? (Dorosz)

Primarily, the hurdles appear to be management policy. ESD has, for a number of reasons, not allowed access to their computers through any network other than DDN. If PL established a direct network connection, PL would find itself under ESD administration. Furthermore, PL/SC has no control over how ESD had routing tables set up in their network software. Several times recently they have been "messed up", not allowing access from PL. As it stands now, PL/SC can only know about this if users notify them of the problem, although thought is being given to more direct notification. What users can do in the meantime to make their connections faster than TELNET through DDN is the following:
On NIU: connect *emis1 ; on PCSA: select TCPGTE from menu, then login: SIO3 (see Paul Toscano for problems. It is realistic to think that all local utilities could be documented in "userinfo" during FY92? Would this mean that hard copy documentation of local utilities would be phased out? (Pelekasis, Partridge)

It is unclear whether most (or all) of the necessary documentation exists in electronic form already and would simply need to be moved to "userinfo", or whether a significant part is still only in hard-copy form. SC will check on this. If the former is true, it could easily be migrated to "userinfo" this year. If not, manpower constraints would not permit a full implementation for all local utilities this year. Users have asked for and will get a "print" option in "userinfo". SC considers "userinfo" to be a brief overview of each topic entry, enough to give the user direction in how he/she can get more detailed information.

Is it possible to provide login notices and "userinfo" documentation to PC users via PCSA? (Gagne)

This is possible now. For login notices related to PCSA (only notices maintained for PC only users), select "7-User and Information Services", then "2-PC Network Notice Utility". For PCSA on-line documentation, type "net help" at the DOS prompt (select "8-Exit to Dos", then type "net help"). Type "auto" to return to main menu.

Do you feel that the users should be aware of near and long-term plans for configuring the PL/GP network? If so, what is the most efficient and effective way of doing it? (Smith)

Yes, users should be aware of PL/GP network plans. This information is currently being provided in several ways: Division Directors are briefed once each spending plan cycle, SC is briefing at individual division meetings being arranged by the division's ISAC representative, the SC network plans are updated every two months at ISAC meetings, and items are placed into the Computer Center quarterly newsletter. Users should attend these meetings to find out about SC plans. Separate users seminars would simply be a rehash of material presented at these meetings, and are considered unnecessary.

Do you feel that the current system of fielding and responding to user inquiries is working well? Please comment. (Pelekasis)

No. It has the following flaws. Whoever answers the phone gets the question. They have the option of answering it themselves, telling the user to call someone else, or to take the question and pass it off to someone they think can answer it. However, there is no quality control or tracking to see that the question is fully answered, or if anyone got back to the user. It can be handed off more than once, and the User Services person who answers it can't be sure that the same question hasn't been answered before. To remedy this, SC is looking at "Help Desk" software, which would allow for immediate user acknowledgement, user tracking of progress, elevation to supervisor electronically after say 48h, cataloging of SC solutions, and enforced notification to users of delays if any are likely.

How do you feel about contributing your "New User Problems and User Services solutions" to an electronic catalog to be used by all User Services personnel for future reference? How would this help you? (Pelekasis)

User services supports this idea, and will make certain that this feature will be a part of the "Help Desk" software that is acquired.

5. SUMMARY OF PRINCIPAL ISSUES AND RECOMMENDATIONS

Table 4 **Principal Issues**

Migration from Cyber to UNIX or VMS
Near-term capability to read Cyber tapes
Long-term data archival system
Continued need for both mainframes and microcomputers
Need for notification upon loss of computer connection
Inaccessibility of ESD, MPC computers for military
Need for more short-term storage for file staging
User's lack of knowledge about use of e-mail
Uncerntainty of distributed file service availability
Userinfo on-line documentation is not widely used
Concern about VAX migration to UNIX
Uncertainty about near-term (5-10 years) network design
A reliable and efficient system of obtaining user service help

Table 5 **Principal Recommendations**

Develop and distribute SC network policy statement and plan

Continued strong mainframe support by SC

Promotion of microcomputer use by SC

Establish reliable network-wide distributed file service

Distributed file service availability of widely-used software

Laboratory-wide ethernet conncections for all users

Provide more complete diagnostics of connection losses

Establish significant disk space for "same-day" file storage

Provide instruction on use of e-mail to users

Complete userinfo on-line documentation on VMS, UNIX, hosts

Make login notices more readable (single screen)

Advertise SC - Division yearly planning meetings widely of

comprehensive "help desk" software by SC Impletation

Appendix A:

On-Line Documentation

A1 Introduction

The on-line document "userinfo" has been implemented on the PL/GP mainframes (except the Cyber) to provide information on the use of local utilities: hardware, software, network, and applications. It is not intended to be exhaustive in its coverage of the utilities it describes. Instead, in "userinfo" the user has a quick, easy-to-use resource to get help on how to use the PL/GP network. Entries in "userinfo" will inform the user of the basics of each utility, so he/she can ask "educated" questions when contacting User Services for further assistance if this is found to be necessary.

A2 Current Contents of Userinfo:

1. VAX:

Table A1. Userinfo on VAX

1	Connecting_to_systems	2	VAX_Mail
3	VAX_Note	4	Editors_&_TPU_procedure
5	Compilers	6	Cray software
7	Magnetic Tape info	8	Batch Jobs
9	TCP/IP (DDN & Local	10	GL E-MAIL matrix
11	GL User Software Library	12	MultiNet Overview
13	Phone Utility	14	DECWindows & VMS V5 infor
15	Using VAX Vectors	16	Graphics Packages
17	Numerical Analysis	18	Printers
19	KERMIT	20	NSI/Internet

21	CFSS on AFGLSC	22	Migrating code to VMS
23	DDN	24	SET PASSWORD
25	USER REP ACCOUNT MANAGEMENT		
		26	SYSTEM SUPPORT CONTRACTS

2. UNIX (Convex, Sun, CD4360)

Table A2. Userinfo on UNIX

1	Introduction	2	Graphics_Packages
3	Graphics_TEKSIM	4	Graphics_NCAR
5	Printers	6	File Transfer Using ftp
7	Cyber Migration	8	NQS Configuration
9	Using afgldmp		

A3 Recommended Additions to Userinfo:

A3.1 VAX

Documentation on the following utilities should be included:

RDB/VMS, DECSLIDE, DECGRAPH, DECALC, VPA, SPM ALL-IN-ONE, DBMS, FMS, CDD, DATARIEVE, 20/20, ORACLE, SPICE, TEL, DXML. In addition, documentation on PCSA and an updated system_support_contacts entry should be included.

A3.2 UNIX (Convex, Sun, CD4360)

Documentation on the following utilities should be included:

Magnetic_tape_info, Compilers, Convex_Vectors, TCP/IP (at present, only FTP documented), IMSL, GKS, PHIGS (in Graphics-Packages), X-windows (including Open Windows), UNIX_NFS, Editors, Batch_jobs, Talk_utility, System_support_contracts, Passwd_utility.

A3.3 All Systems

As mentioned earlier, "userinfo" is not intended to be a comprehensive documentation, but should a least give the user enough information so that he/she can get the question answered. For this reason, it is important to include in each entry of "userinfo" where one can go for further documentation or help. It may be that the first source recommended in many cases is the hard-copy documentation maintained in the User Services area.

In addition, an "address book" giving the host name, IP address (alphanumeric and numeral), location within the laboratory, and name of system administrator for each network host should be included in all versions of "userinfo". Such a document exists in partial form on paper; it should be augmented, updated, and put on-line.